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SPECIFICATION
2017 VERSION 1.0

NANOSOX *FABRIC AIR DISPERSION SYSTEM*

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Note

1. Users of this specification should refer to the relevant professional or experts for any technical advice on the subject matter. Durkeesox shall not be liable for any damages whether directly or indirectly suffered by anyone as a result of reliance on this specification.
2. Compliance with this specification does not exempt users from legal obligations.

Contents

PART ONE GENERAL

1.1 Product Description

Scope of Work

Non-metal ductworks indicated by requirements in this section and on drawings.

Non-metal ductwork types specified in this project: Fabric air dispersion system.

1.2 Normative references

The following referenced documents are indispensable for the application of this specification. For references, the latest edition of the referenced document,including any amendments, applies.

ISO 9001	Quality Management Systems
ISO 18001	Environmental Friendly Management System
ISO14001	Occupational Health and Safety Management System
EN 13501	Fire classification of construction products and building Elements---Part 1: Classification using data from reaction to Fire tests.
ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
BS476 Part 6 & Part 7	British building material standard
AS/NZS 1530.3-1999	Methods for Fire Tests on Building Materials, Components and Structures Part 3: Simultaneous Determination of Ignitability, Flame Propagation, Heat Release and Smoke Release
AC 167	Acceptance Criteria for Fabric Air Dispersion System, USA

UL2518 Outline for Air Dispersion System Materials

1.3 Quality Assurance:

1) Manufacturer shall follow British, European Union or America standards.
2) Manufacturing facility has established a quality management system certified by international organization for standardization of ISO9001
3) Manufacturing facilities have established an environmental friendly management system and by international organization for standardization of ISO14001
4) Manufacturing facilities have established an occupational, health and safety management system this is certified by international organization for standardization of ISO18001 (1999)
5) Manufacturer shall have documented design support, including duct layout, dimension, fabric permeability rate selection and orifice information, suspension systems. Other design parameters including optimum air velocity, terminal air velocity to occupied area, airflow, static pressure and installation height shall also be take into considerations.
6) Manufacturer shall simulate the actual installation condition after finished production within their testing lab and submit testing records and results. All the system must be 100% guarantee the designed performance.

1.4 Standards and Code Compliance

1) Fabric Air dispersion system shall be constructed of washable100% inherent permanent fire retardant polyester material. Fire retardant treatment or coated fabrics are not acceptable.
2) Fire safety performance won't degrade after repeated (no less than 50 times) laundering approved by third party certificate.

3) Fabric air dispersion system must be in accordance with all following international standards:

A. Fabric air dispersion system must be classified in accordance with the British building material standard – BS476 Part 6 & Part 7 - Class 0.

B. Fabric air dispersion system must be classified in accordance with the Standard Test Method for Surface Burning Characteristics of Materials—ASTM E84. The flame spread classification is 0 while smoke developed classification is 45.

C. Fabric air dispersion system must be classified in accordance with Methods for Fire Tests on Building Materials, Components and Structures Part 3: Simultaneous Determination of Ignitability, Flame Propagation, Heat Release and Smoke Release-- AS/NZS 1530.3-1999. Ignitability index is 0 (range 0-20), spread of flame index is 0 (range 0-10),heat evolved index is 0 (range 0-10), smoke developed index is 1(range 0-10).

D. Fabric air dispersion system must be listed under America UL classification AJIJ and UL 2518 / ICC AC167 and CAN/ULC S102. Only third party test report on UL723 is not acceptable. It shall comply with the flame spread and smoke developed index of less than 25/50 as per American NFPA90-A, latest revision.

E. Fabric air dispersion system must be classified in accordance with the European Union standard of flame spread/smoke development requirements EN 13501-1: 2007 - Class B-s1, d0.

F. Third Party fire safety performance Test certificate with 50 times washings: Verification test performed by international accredited independent testing organization

G. Fabric Permeability rate should be selected and submitted with manufacturer's drawing and permeability rate designed must approved by international third party testing certificates.

1.5 Submittals:

1) Submit Manufacturer's specifications on both material and finished product.
2) Submit copies of all certificates mentioned on clause 1.2
3) Submit manufacturer's technical data of fabric air dispersion system
4) Submit manufacturer's performance data report of each fabric duct system testing in factory simulation lab including airflow rate, inlet velocity, static pressure and end velocity out of duct.
5) Submit CFD (computational fluid dynamic) simulation report to verify the design and expected performance if necessary.
6) Submit manufacturer's maintenance data

1.6 Warranty:

For Nanosox-N series, manufacturer shall provide 15 years full guarantee, for Nanosox-L series, manufactures shall provide 10 years full guarantee, for Fibersox, manufacturer shall provide 8 years full guarantee.

1.7 Delivery:

Fabric air dispersion system shall be properly packaged and labeled during handling, shipping and storage to prevent damage.

Product shall be stored in indoor location, and protected from weather.

PART TWO PRODUCT

2.1 Manufacturer:

1) Manufacturer much complies with all mentioned described requirements on the spec.
2) Approved manufacturer:

   DurkeeSox(Wuhan) Air Dispersion System Co. Ltd. (China)

   http://www.durkeesox.com

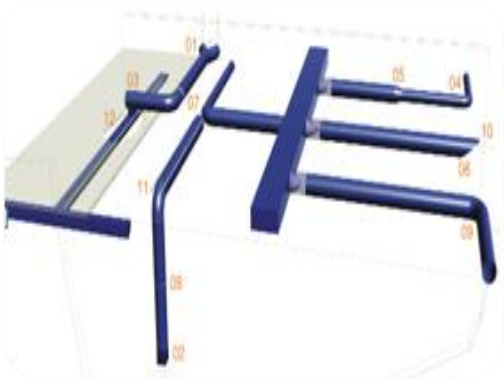
2.2 Product Description

Made of special hi-tech inherent permanent fire resistant fabric materials, fabric air dispersion system is a terminal air dispersion system that transfers and distributes conditioned air in the space, replacing traditional ductwork, air dampers, diffusers and insulation. Fabric air dispersion system is constructed in round, half-round, quarter-round, rectangle shape.

Fabric air dispersion system works under static pressure, positive static pressure from the fan blower is required to keep inflated.

The air will be dispersed from the entire length of the duct through fabric permeation, and/or through precisely-calculated orifices or nozzles.

Given the light weight of the fabric ducting, fabric air dispersion system is easy to install and do maintenance. The fabric material is used instead of metal, they are not prone to rust or corrosion.



2.3 Fabric Material

1) Fabric air dispersion system shall be constructed of a washable 100% inherent permanent fire retardant and permeable polyester fabric. Fire retardant treated or coated fabrics are not acceptable. Fabric material should be complying with all properties mentioned on clause 1.3

   Other properties required as following:

2) Weight: 220-250 g/m2 (5.25-8 oz/yd2) tested per ASTM D3776, latest revision.

3) Shrinkage: < 0.5%.

4) Permeability: the permeability of fabric materials is one of the most important factor to provide comfort and prevent condensation in any fabric ducting system. The choice

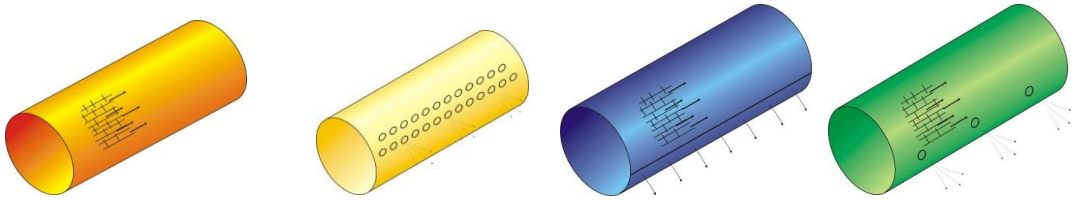
of fabric permeability vary and are dependent on manufacturer, country of use and its application. Multiple permeability ratings especially micro-permeability will strike a proper balance between anti-condensation and energy-saving. It is recommended that for ventilation application, Non-permeable fabric is preferred. For large and high space, micro- permeability ratings (0.2 ~1 cfm/ft2 at 0.5".W.G) is preferred. For large and low space, for cold storage or application requiring for small terminal air velocity or draft free, large permeability ratings (8~20cfm/ ft2 at 0.5".W.G) is preferred.

5) Tensile strength(warp/weft): 1200/1240 N
6) Tear strength (warp/weft): 23.2/29N
7) Elongation (at first break): 29/24%
8) Standard colors: White, Light grey, grey, Red, Blue, Green, Black, Beige, Yellow and customized color.

2.4 Permeability data sheet:

Fabric Material Type	Permeability(cfm/ft2 in 125 Pa)
Nanosox-N Series	0/0.2/0.5/1/2/4/6/8/16/20
Nanosox – L Series	0/0.5/2/6/16
Fibersox	0
Note: Permeability unit in the table is tested at 125Pa; Customized permeability are available as per project requirement;	

2.5 Air Distribution Model



PM **EJ** **PS** **PE**

Note:

PM---100% permeation EJ---Ejection

PS----Permeation and slot PE---Permeation and Ejection

2.6 System Fabrication

1) Air is discharged through laser cutting orifices and fabric permeation to achieve different airflow and throw suggested by manufacturer.
2) Inlets are to be connected to metal duct via anchor patches supplied by manufacturer. Zip screw fastener used for secure inlet anchor patches are to be supplied by contractor.
3) Zipper connection shall be used to connect inlet, end cap and duct segments when deemed necessary by manufacturer for easy removal and maintenance.
4) ACD (Airflow Control Device) and PAD (Pressure Adjustment Device) shall be included for airflow and pressure adjustment as specified by manufacturer.
5) Multiple piece constructed fittings (including elbow, T-connector, square to round, Y inlet, expansion segment, wall pass through and tension ring) shall be used to for special segment interconnections specified by manufacturer.
6) Sections are joint using YKK heavy duty zipper with cover sleeve.
7) Inlet connection part: Detachable double layers zippered inlet collar with cover-up sleeve concealing Belt and anchors.
8) Separated End cap: End part of each fabric air duct should use separated end cap connection by zipper for easy to take off and maintenance.
9) All air outlets/openings are by automatic laser cutting made not by any plastic mesh or others.

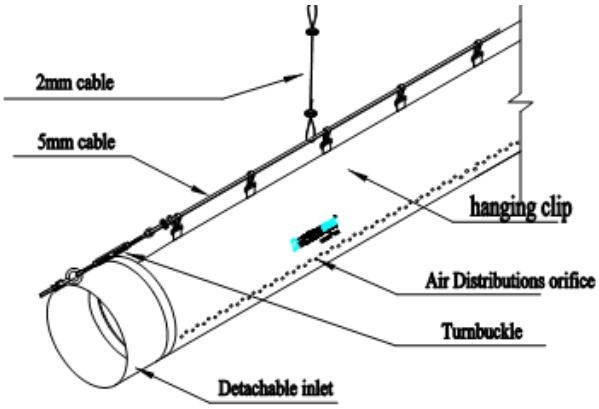
2.7 System Design

1) Fabric air dispersion system shall only be used for positive pressure situation in HVAC/R system with exposed area only
2) System shall be designed to work with inlet static pressure from minimam70 Pa, or 0.25” water gage to 1900 Pa, or 7.6” water gage.
3) Designed temperature shall be between -53 ℃ ~ +130 ℃ (-63 ℉– 266 ℉).
4) System length, diameter, static pressure and airflow shall be approved by manufacturer.

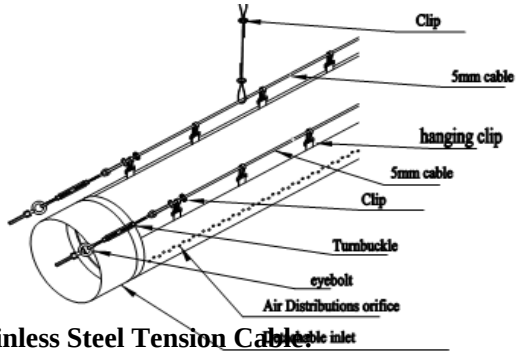
2.8 Suspension System

Option 1 - Galvanized Tension Cable:

a) Suspension system consists of one row or two rows or multi-rows of plastic coated galvanized cables located 50mm to 90mm (2" to 4") above fabric duct mounting points. Mounting points shall locate at 12 o'clock (for single row suspension), and 10, 2 o'clock double row suspension, or specified multi-rows o'clock positions for rectangular duct. Distance between clips shall not exceed 500 mm (20").



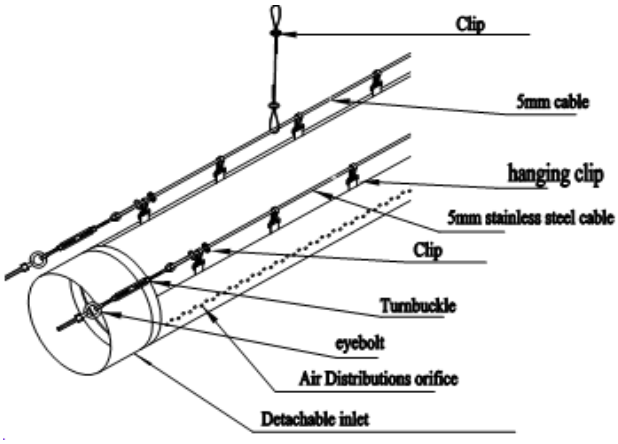
b) Double row suspension is recommended for ducts with diameter larger than 500 mm (20"). Cable and accessories include 5mm plastic coated galvanized cable, eye bolts, turnbuckles, cable clamps, 2mm mid-supporting cable shall be supplied by fabric duct manufacturer. Mounting bracket at both ends of tension cables shall be supplied by contractor.



Option 2 - Stainless Steel Tension Cable:

a) Suspension system consists of one row or two rows or multi-rows of plastic coated galvanized cables located 50mm to 90mm (2" to 4") above fabric duct mounting points. Mounting points shall locate at 12 o'clock (for single row suspension), and 10, 2 o'clock for double row suspension, or specified multi-rows o'clock positions for rectangular duct. Distance between clips shall not exceed 500 mm (20").

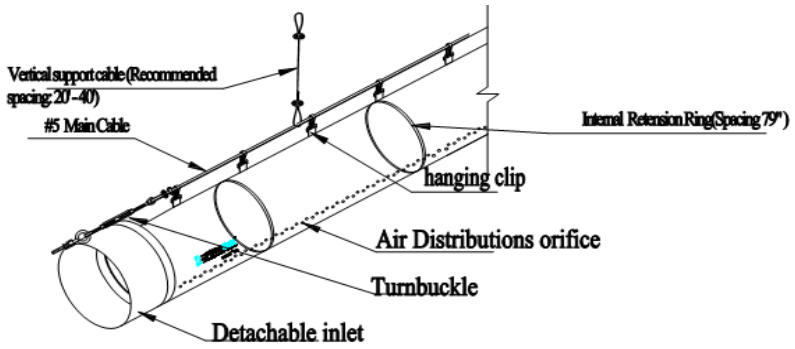
b) Double row suspension is recommended for ducts with diameter larger than 500 mm (20”).Cable and accessories include 5mm stainless steel tension cable, eye bolts, turnbuckles, cable clamps, 2mm mid-supporting cable shall be supplied by fabric duct manufacturer. Mounting bracket at both ends of tension cables shall be supplied by contractor.



Option 3 IRR (Internal Retention Ring) system with Galvanized Tension Cable suspension

a) Suspension system consists of IRR (Internal retention ring) system fixed inside of duct to keep duct shape while deflated and eliminates start POP noise. with one row or two rows or multi-rows of plastic coated galvanized cables located 50mm to 90mm (2” to 4”) above fabric duct mounting points. Mounting points shall locate at 12 o’clock (for single row suspension), and 10, 2 o’clock double row suspension, or specified multi-rows o’ clock positions for rectangular duct. Distance between clips shall not exceed 500 mm (20”). On the endcap of each duct piece, there are two D-shaped clip, One end of the pulling cable shall tie onto the D-shaped clip, the other end of the pulling cable shall fix on the wall or roof bracket, the pulling cable system is used to straighten the entire duct,

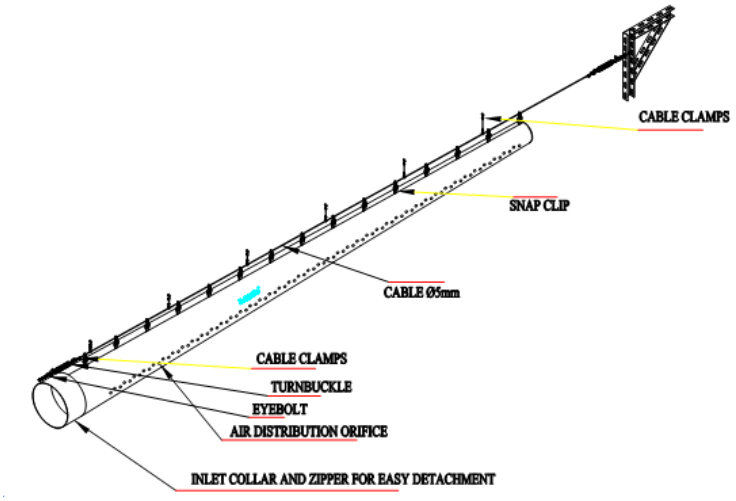
b) Double row suspension is recommended for ducts with diameter larger than 559 mm (22”). Cable and accessories include 5mm plastic coated galvanized cable, eye bolts, turnbuckles, cable clamps, 2mm mid-supporting cable shall be supplied by fabric duct manufacturer. Mounting bracket at both ends of tension cables shall be supplied by contractor.



Option 4 URR (Uniform air velocity Conic Duct with Internal Retention Ring) system with Galvanized Tension Cable suspension

a) Suspension system consists of IRR (Internal retention ring) system pre-installed inside of duct to keep duct shape while deflated and eliminates start POP noise. With one row or two rows or multi-rows of plastic coated galvanized cables located 50mm to 90mm (2" to 4") above fabric duct mounting points. Mounting points shall locate at 12 o'clock (for single row suspension), and 10, 2 o'clock double row suspension, or specified multi-rows o' clock positions for rectangular duct. Distance between clips shall not exceed 500 mm (20"). On the endcap of each duct piece, there are two D-shaped clip, One end of the pulling cable shall tie onto the D-shaped clip, the other end of the pulling cable shall fix on the wall or roof bracket, the pulling cable system is used to straighten the entire duct. Since the URR system is in conic shape, the spacing between cables are continuously reducing, the spacing between cables shall be calculated and advised by manufacturer.

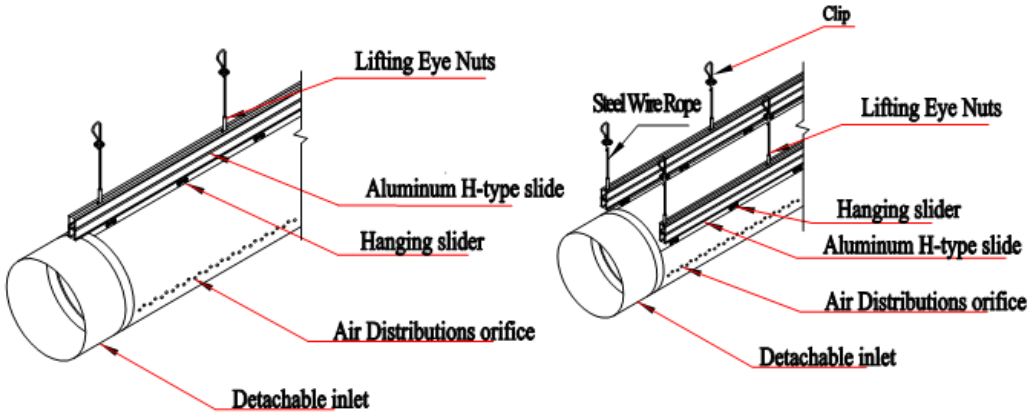
b) Double row suspension is recommended for ducts with diameter larger than 559 mm (22"). Cable and accessories include 5mm stainless steel tension cable, eye bolts, turnbuckles, cable clamps, 2mm mid-supporting cable shall be supplied by fabric duct manufacturer. Mounting bracket at both ends of tension cables shall be supplied by contractor.



Option 5 Suspended H-Track:

a) Suspension system consists of one row or two rows of aluminum H-track with slots on top and bottom, located 50mm (2") above fabric duct mounting points. Mounting points shall locate at 12 o'clock (for single row suspension), and options of 10, 2 o'clock, and 9, 3 o'clock positions (for double row suspension). Distance between clips shall not exceed 500mm (20").

b) Double row suspension is recommended for ducts with diameter larger than 508 mm (20"). Track and accessories include track connectors, end-block, vertical support kits, shall be supplied by manufacturer.

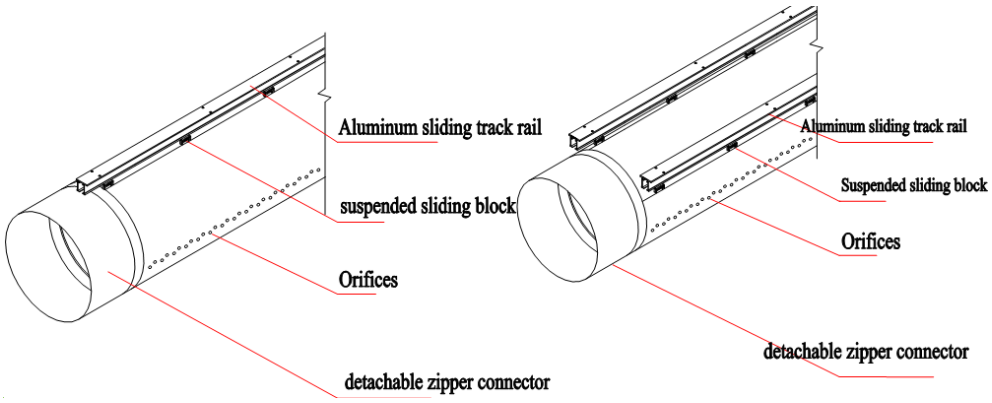


Option 6 Surface mount N-Track:

a) Suspension system consists of one row or two rows of aluminum N-track with slot on the bottom, located 12mm to 25mm (1/2" to 1") above fabric duct mounting points. Mounting points shall locate at 12 o'clock (for single row suspension), and two edges of half round ducts (for double row suspension). Distance between clips shall not

exceed 500mm (20”). Mounting on the ducts has the option of detachable slide clip or corded edge.

Track and accessories include track connectors, end-block, shall be supplied by manufacturer.



2.9 AHU

Air handler unit shall provide adequate filter and adjustable frequency regulator prior entering the fabric duct system.

PART THREE INSTALLATION AND MAINTENANCE

3.1 Exam designated installation space; avoid interference with existing piping, fixtures, and structures. Install suspension system as per manufacturer’s instruction. Installation manual shall be supplied with product by manufacturer.

3.2 Maintenance and clean

Use of disposable latex gloves are recommended to prevent soil the product.

Air handler and any upstream sheet metal ductwork shall be cleaned, and ensure free of dust and other foreign particles before the fabric air dispersion system is connected.

Fabric ducts shall be removed and cleaned in accordance to manufacturer’s guidance if it is soiled before installation finishes.

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End of Fabric Air Dispersion System Specification

Subject to change without notice

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